

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : B. BRENNER et al. Confirmation No.: 3378
Appln. No. : 10/757,419 Group Art unit: 3644
Filed : January 15, 2004 Examiner: T. Q. Dinh
For : LIGHTWEIGHT STRUCTURAL COMPONENT IN PARTICULAR FOR AIRCRAFT AND METHOD FOR ITS PRODUCTION

AMENDMENT UNDER 37 C.F.R. 1.116

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Window, Mail Stop AF
Randolph Building
401 Dulany Street
Alexandria, VA 22314
Sir:

Responsive to the Official Action of March 1, 2007, reconsideration and withdrawal of the rejections made therein are respectfully requested, in view of the following amendments and remarks.

Inasmuch as the three-month shortened statutory period set in the office action expires on June 1, 2007, Applicant submits that the instant response is timely and that no extensions of time are required. If for any reason an Extension of Time is deemed to be required and is not associated with the file, or the fee is deemed insufficient, authorization is hereby given to charge any fees necessary to preserve pendency of this application to deposit account No. 19-0089.

Amendments to the claims begin on page 2; and

Remarks begin on page 23.

IN THE CLAIMS

Please amend claims 1, 11, 58 and 136 as follows:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A lightweight structural component comprising:
at least one metal panel;
at least one metal stiffening element;
the at least one metal stiffening element comprising two side pieces; and
each end surface of the two side pieces being at least partially connected to the at least one metal panel in a material-locking manner,
wherein the two side pieces are connected to the at least one metal panel at two separate weld joint zones.
2. (Original) The component of claim 1, wherein the component is utilized in an aircraft and the at least one stiffening element is oriented at least one of a lengthwise and a crosswise direction relative to the at least one panel.
3. (Original) The component of claim 1, wherein the at least one panel comprises a skin sheet.
4. (Previously Presented) The component of claim 1, wherein the at least one panel comprises a thickened region in an area of the two separate weld joint zones.
5. (Original) The component of claim 1, wherein the at least one stiffening element comprises a stringer which is oriented in a lengthwise manner.

6. (Withdrawn) The component of claim 1, wherein the at least one stiffening element comprises a rib that runs in a circumferential direction.

7. (Previously Presented) The component of claim 1, wherein the two separate weld joint zones comprise laser beam weld zones.

8. (Previously Presented) The component of claim 1, wherein the two separate weld joint zones comprise friction stir weld zones.

Claims 9 and 10 (Canceled).

11. (Currently Amended) The component of claim 1, A lightweight structural component comprising:

at least one metal panel;

at least one metal stiffening element;

the at least one metal stiffening element comprising two side pieces; and

each of the two side pieces being at least partially connected to the at least one metal panel in a material-locking manner,

wherein the two side pieces are connected to the at least one metal panel at two separate weld joint zones, and

wherein the at least one panel comprises a panel stiffening base having an outer portion and an inner portion arranged between inner surfaces of the two side pieces.

12. (Previously Presented) A lightweight structural component comprising:

at least one panel;

at least one stiffening element;

the at least one stiffening element comprising two side pieces;

each of the two side pieces being at least partially connected to the at least one panel in a material-locking manner;

the two side pieces being connected to the at least one panel at two separate joint zones; and

the at least one panel comprising a panel stiffening base having an outer portion and an inner portion arranged between inner surfaces of the two side pieces,

wherein the inner portion comprises a thickness d_{Hv} that is greater than a thickness d_{Hs} of the outer portion and wherein side surfaces of the inner portion rest against or adjacent to inner surfaces of the two side pieces.

13. (Original) The component of claim 12, wherein the two separate joint zones respectively extend at least partially up to the side surfaces of the inner portion.

14. (Original) The component of claim 1, wherein the two side pieces are bent or oriented away from each other by a total angle α , whereby inner surfaces of the two side pieces and a surface of the at least one panel form a generally isosceles triangle.

15. (Original) The component of claim 14, wherein the angle α lies in a range of between approximately 7° and approximately 50°.

16. (Previously Presented) A lightweight structural component comprising:
at least one panel;
at least one stiffening element;
the at least one stiffening element comprising two side pieces;
each of the two side pieces being at least partially connected to the at least one panel in a material-locking manner;
the two side pieces being connected to the at least one panel at two separate joint zones,

wherein the at least one stiffening element comprises the following:

a ratio between a side piece thickness t_s in a plane of each joint zone and a thickness d_s of the at least one stiffening element comprises approximately $0.5 \leq t_s/d_s \leq$ approximately 1.8;

a ratio between each side piece length s_s and a height h_s of the at least one stiffening element comprises approximately $0.15 \leq s_s/h_s \leq$ approximately 0.7; and

an angle β between the panel and each joint surface of each joint zone comprises approximately $0^\circ \leq \beta \leq$ approximately 25° .

17. (Original) The component of claim 16, wherein the at least one stiffening element further comprises the following:

a ratio of each side piece thickness b_{s0} near a branching of the two side pieces and a side piece thickness t_s in a plane of each joint zone comprises approximately $0.28 \leq b_{s0}/t_s \leq$ approximately 1.

18. (Withdrawn) The component of claim 1, wherein the two side pieces are bent or oriented at a total angle α of approximately 180° , whereby inner surfaces of the two side pieces rest on a surface of at least one panel.

19. (Withdrawn) The component of claim 18, wherein the two side pieces are integrally formed with the at least one stiffening element, whereby the at least one stiffening element and the two side pieces comprise a one-piece member.

20. (Original) The component of claim 1, wherein the two side pieces are integrally formed with the at least one stiffening element, whereby the at least one stiffening element and the two side pieces comprise a one-piece member.

21. (Previously Presented) A lightweight structural component comprising:
 - at least one panel;
 - at least one stiffening element;
 - the at least one stiffening element comprising two side pieces;
 - each of the two side pieces being at least partially connected to the at least one panel in a material-locking manner;
 - the two side pieces being connected to the at least one panel at two separate joint zones,
 - wherein the two side pieces comprise tapered surfaces, whereby a thickness of the two side pieces near a bar portion of the at least one stiffening element is less than a thickness of the two side pieces near the two separate joint zones.
22. (Withdrawn) The component of claim 1, wherein the at least one stiffening element comprises a generally U-shaped profile, whereby the two side pieces are arranged on opposite ends of a head of the at least one stiffening element.
23. (Withdrawn) The component of claim 22, wherein the two side pieces of the generally U-shaped profile are parallel to each other.
24. (Original) The component of claim 1, wherein the at least one stiffening element comprises an edge area which is oriented in a generally parallel manner relative to the at least one panel.
25. (Original) The component of claim 1, wherein the at least one panel comprises a panel reinforcing base portion which comprises a first base portion and a second base portion separated from the first base portion, wherein lateral outer surfaces of the first and second base portions rest against or adjacent to inner surfaces of the two side pieces.

26. (Previously Presented) The component of claim 1, wherein an area of the at least one panel comprising the two weld joint zones comprises a surface formed by metal cutting.

27. (Previously Presented) The component of claim 1, wherein an area of the at least one panel comprising the two weld joint zones comprises a surface formed by metal removal.

28. (Withdrawn) The component of claim 1, wherein at least one of the two side pieces comprises cut-outs.

29. (Withdrawn) The component of claim 1, wherein at least one of the two side pieces comprises a plurality of through openings.

30. (Withdrawn) The component of claim 1, wherein each of the two side pieces comprises cut-outs and wherein the cut-outs are arranged at generally regular intervals "a".

31. (Withdrawn) The component of claim 1, wherein each of the two side pieces comprises through openings arranged at generally regular intervals "a".

32. (Withdrawn) The component of claim 31, wherein a distance between an edge of the through openings and joint surfaces of the two joint zones is greater than approximately one and a half times a side piece thickness t_s measured in a plane of each joint zone.

33. (Withdrawn) The component of claim 31, wherein the through openings in one of the two side pieces are spaced from each other by a distance "a" and wherein the through

opening of the other of the two side pieces are spaced from the through openings of the one of the two side pieces by a distance of approximately $a/2$.

34. (Withdrawn) The component of claim 31, wherein the through openings comprise circular openings.

35. (Withdrawn) The component of claim 31, wherein the through openings comprise polygonal openings.

36. (Withdrawn) The component of claim 31, wherein the through openings comprise non-circular openings.

37. (Withdrawn) The component of claim 31, wherein the through openings comprise triangular openings.

38. (Withdrawn) The component of claim 37, wherein the triangular openings comprise approximately equal-sided triangular openings with rounded corners, and wherein vertices of adjacent triangular openings point in opposite directions.

39. (Withdrawn) The component of claim 1, further comprising a doubler plate made of a damage-tolerant fiber-reinforced laminate attached to outer surfaces of the two side pieces.

40. (Withdrawn) The component of claim 1, further comprising at least one stress relief element located inside the at least one panel.

41. (Withdrawn) The component of claim 40, wherein the at least one panel comprises a thickened panel base arranged in an area of the two separate joint zones and wherein the at least one stress relief element is arranged within the thickened panel base.

42. (Withdrawn) The component of claim 41, wherein the at least one stress relief element is arranged beneath a bar portion of the at least one stiffening element and between the two separate joint zones.

43. (Withdrawn) The component of claim 40, wherein the at least one stress relief element comprises a material having a higher modulus of elasticity and a higher fatigue strength than a material of the at least one panel.

44. (Withdrawn) The component of claim 40, wherein the at least one stress relief element comprises a plurality of stress relief elements.

45. (Withdrawn) The component of claim 40, wherein the at least one stress relief element comprises a plurality of spaced apart stress relief elements.

46. (Withdrawn) The component of claim 40, wherein the at least one stress relief element comprises a high-strength wire cable.

47. (Withdrawn) The component of claim 40, wherein the at least one stress relief element is located directly beneath a panel stiffening base of the at least one panel and is centrally disposed between the two separate joint zones.

48. (Withdrawn) The component of claim 47, wherein the panel stiffening base is integrally formed with the at least one panel, whereby the panel stiffening base and the at least one panel comprise a one-piece member.

49. (Original) The component of claim 1, wherein the at least one panel comprises a panel stiffening base made of material that is deformed during a rolling-in of a stress relief element into the at least one panel.

50. (Original) The component of claim 1, wherein the at least one panel comprises a panel stiffening base made of material that is deformed during a rolling of the at least one panel.

51. (Withdrawn) The component of claim 1, wherein the at least one panel comprises a plurality of panel bars arranged generally parallel to one another and generally parallel to the at least one stiffening element.

52. (Withdrawn) The component of claim 1, wherein the at least one panel comprises a plurality of panel bars arranged generally parallel to one another and generally perpendicular to the at least one stiffening element.

53. (Withdrawn) The component of claim 1, wherein the at least one panel comprises a plurality of panel bars, some of which are arranged generally parallel to one another and some of which are arranged generally perpendicular to one another.

54. (Withdrawn) The component of claim 1, wherein the at least one panel comprises a plurality of panel stiffening bases and a plurality of panel bars, wherein a height of the panel bars generally corresponds to a height of the panel stiffening bases, wherein the at least one stiffening element comprises a plurality of stiffening elements, and wherein a spacing between the stiffening elements is generally equal to an integral multiple of a spacing "C" between the panel bars.

55. (Original) The component of claim 1, wherein the at least one stiffening element comprises a head portion that is coupled to a bar portion.

56. (Withdrawn) The component of claim 55, wherein the head portion projects from both sides of the bar portion.

57. (Withdrawn) The component of claim 56, wherein the head portion projects by generally equal amounts from both sides of the bar portion.

58. (Currently Amended) A lightweight structural component comprising:
at least one metal panel comprising at least one thickened region;
at least one metal stiffening element welded to the at least one panel;
the at least one metal stiffening element comprising a bar portion and two side pieces; and

each end surface of the two side pieces being at least partially connected in a material-locking manner to the at least one thickened region by two separate weld joint zones,

whereby the at least one metal stiffening element is oriented in at least one of a lengthwise and a crosswise direction.

59. (Original) The component of claim 58, further comprising a reinforcing element located in a cavity formed by the two side pieces and a surface of the at least one thickened region.

60. (Original) The component of claim 59, wherein the at least one thickened region comprises a panel stiffening base and wherein the reinforcing element comprises a high-strength material having a modulus of elasticity that is generally greater than a modulus of

elasticity of a material of at least one of the at least one panel and the at least one stiffening element.

61. (Original) The component of claim 60, wherein the reinforcing element is connected to at least one of the two side pieces and to the at least one panel stiffening base in one of a force-locking manner and a form-locking manner.

62. (Original) The component of claim 58, wherein the component is arranged on an aircraft.

63. (Original) The component of claim 58, wherein the at least one stiffening element comprises a stringer oriented in a lengthwise direction.

64. (Withdrawn) The component of claim 58, wherein the at least one stiffening element comprises a rib oriented in a circumferential direction.

65. (Previously Presented) The component of claim 58, wherein the two separate weld joint zones comprise laser beam weld zones.

66. (Previously Presented) The component of claim 58, wherein the two separate weld joint zones comprise friction stir weld zones.

Claims 67-68 (Canceled).

69. (Previously Presented) The component of claim 58, wherein the two weld joint zones comprise panel surfaces and surfaces of the two side pieces, and wherein each of the panel and two side piece surfaces comprises a machined surface.

70. (Original) The component of claim 58, further comprising a reinforcing element having surfaces which are both force-locked and form-locked to at least one of inner surfaces of the two side pieces and a surface of the thickened region.

71. (Original) The component of claim 70, wherein the surfaces comprise at least one of a rough profile and surface profiling.

72. (Original) The component of claim 58, further comprising a reinforcing element which comprises surfaces which are fixed to at least one of inner surfaces of the two side pieces and a surface of the thickened region.

73. (Original) The component of claim 58, further comprising a cavity formed by the two side pieces and the at least one thickened region and a reinforcing element arranged within the cavity.

74. (Original) The component of claim 73, wherein a cross-sectional shape of the cavity generally corresponds to a cross-sectional shaped of the reinforcing element.

75. (Original) The component of claim 74, wherein the cavity comprises a cross-sectional shape having a form of a generally equal isosceles triangle with a rounded-off apex.

76. (Original) The component of claim 74, wherein the reinforcing element comprises a cross-sectional shape having a form of a generally equal isosceles triangle with a rounded-off apex.

77. (Withdrawn) The component of claim 58, further comprising at least one reinforcing element arranged within the at least one thickened region.

78. (Withdrawn) The component of claim 58, further comprising at least one reinforcing element arranged between the two side pieces, wherein the at least one reinforcing element comprises one of a wire, a rod, a wire rope, a pipe and a tube.

79. (Withdrawn) The component of claim 78, wherein the at least one thickened region comprises a curved surface and wherein the two side pieces comprises curved inner surfaces, whereby the curved surfaces enclose the at least one reinforcing element.

80. (Withdrawn) The component of claim 79, wherein the two side pieces contact at least approximately 180° of a circumferential surface of the at least one reinforcing element.

81. (Withdrawn) The component of claim 79, wherein the two side pieces comprise portions which are arranged parallel to one another, whereby a spacing between inner surfaces of the two side pieces generally corresponds to a diameter of the at least one reinforcing element.

82. (Withdrawn) The component of claim 58, wherein the at least one thickened region comprises a panel stiffening base which contains a recess adapted to receive a reinforcing element.

83. (Withdrawn) The component of claim 58, further comprising a plurality of cut-outs arranged in at least one of the bar portion and the two side pieces, wherein the cut-outs are arranged at regular intervals "a".

84. (Withdrawn) The component of claim 58, further comprising a plurality of through openings arranged in at least one of the bar portion and the two side pieces, wherein the through openings are arranged at regular intervals "a".

85. (Withdrawn) The component of claim 58, further comprising a plurality of through openings arranged in at least one of the bar portion and the two side pieces.

86. (Withdrawn) The component of claim 85, wherein the through openings comprise a circular through openings.

87. (Withdrawn) The component of claim 85, wherein the through openings comprise non-circular through openings.

88. (Withdrawn) The component of claim 85, wherein the through openings comprise polygonal through openings.

89. (Withdrawn) The component of claim 85, wherein the through openings comprise generally approximately equilateral triangular through openings with rounded-off corners.

90. (Withdrawn) The component of claim 89, wherein adjacent triangular through openings are oriented in opposite directions.

91. (Withdrawn) The component of claim 85, wherein the through openings of one of the two side pieces are arranged offset from the through openings of another of the two side pieces, whereby a distance between the through openings of each of the two side pieces comprises a value "a", and whereby a distance between each of the through openings of one of the two side pieces and each of the through openings of another of the two side pieces comprises a value of approximately $a/2$.

92. (Withdrawn) The component of claim 58, further comprising a plurality of stress relief elements arranged within the at least one thickened region.

93. (Withdrawn) The component of claim 92, wherein at least one of the plurality of stress relief elements is arranged on one side of the bar portion and wherein at least another of the plurality of stress relief elements is arranged on another side of the bar portion.

94. (Withdrawn) The component of claim 92, wherein at least one of the plurality of stress relief elements is arranged near each of the two separate weld joint zones.

95. (Withdrawn) The component of claim 92, wherein at least one of the plurality of stress relief elements comprises a material having a higher modulus of elasticity and a higher fatigue strength than a material of the at least one panel.

96. (Withdrawn) The component of claim 92, wherein at least one of the stress relief elements comprises a high-strength wire cable.

97. (Original) The component of claim 58, wherein the at least one panel comprises a sheet skin for one of an aircraft, a boat and a ship.

98. (Withdrawn) The component of claim 58, wherein the at least one panel comprises a plurality of integrally formed panel bars .

99. (Withdrawn) The component of claim 98, wherein the plurality of panel bars are arranged generally parallel to the at least one stiffening element.

100. (Withdrawn) The component of claim 98, wherein the plurality of panel bars are arranged generally perpendicular to the at least one stiffening element.

101. (Withdrawn) The component of claim 98, wherein the plurality of panel bars are arranged generally parallel to one another and generally parallel to the at least one stiffening element.

102. (Withdrawn) The component of claim 98, wherein a height of the panel bars corresponds to a height of the at least one thickened region.

103. (Withdrawn) The component of claim 98, wherein the at least one stiffening element comprises a plurality of stiffening elements which are spaced apart from one another by an amount equal to an integral multiple of a spacing "C" of the panel bars.

104. (Withdrawn) The component of claim 58, wherein the at least one stiffening element comprises a head which is centrally disposed on the bar portion.

105. (Withdrawn) A method of producing the lightweight structural component of claim 1, the method comprising:

milling the at least one metal panel to form at least one thickened region; and
extruding the at least one metal stiffening element;
subjecting the at least one metal panel to tension;
subjecting the at least one metal stiffening element to tension; and
joining the two side pieces to the at least one thickened region at the two separate weld joint zones.

106. (Withdrawn) A method of producing the lightweight structural component of claim 1, the method comprising:

milling the at least one metal panel to form at least one thickened region; and
joining the two side pieces of the at least one metal stiffening element to the at least one panel at the two separate weld joint zones.

107. (Withdrawn) The method of claim 106, further comprising extruding the at least one stiffening element.

108. (Withdrawn) The method of claim 106, further comprising subjecting the at least one panel to tension.

109. (Withdrawn) The method of claim 106, further comprising subjecting the at least one stiffening element to tension.

110. (Withdrawn) The method of claim 106, wherein the joining comprises joining the two side pieces to the at least one thickened region by laser beam welding.

111. (Withdrawn) The method of claim 106, wherein the joining comprises joining the two side pieces to the at least one thickened region by laser beam welding, and wherein a laser beam focus is formed such that it is one of extended in a feed direction and divided into two partial beams.

112. (Withdrawn) The method of claim 106, wherein the joining comprises joining the two side pieces to the at least one thickened region by friction stir welding.

Claims 113-114 (Canceled).

115. (Withdrawn) The method of claim 106, wherein the joining comprises simultaneously joining the two side pieces to the at least one thickened region.

116. (Withdrawn) The method of claim 106, wherein the joining comprises unilaterally joining the two side pieces to the at least one thickened region.

117. (Withdrawn) The method of claim 106, wherein the joining comprises joining the two side pieces one at a time to the at least one thickened region.

118. (Withdrawn) The method of claim 106, further comprising, before the joining, forming the two side pieces by extrusion.

119. (Withdrawn) The method of claim 106, further comprising extruding the at least one stiffening element and the two side pieces to form a one-piece extruded member.

120. (Withdrawn) The method of claim 106, further comprising forming the at least one stiffening element as an extruded rib, wherein the two side pieces comprise inner curved surfaces, and wherein the thickened region comprises a curved surface.

121. (Withdrawn) The method of claim 106, wherein the milling comprises chemical milling.

122. (Withdrawn) The method of claim 106, wherein the milling comprises mechanical milling.

123. (Withdrawn) The method of claim 106, wherein the milling comprises HSC milling.

124. (Withdrawn) The method of claim 106, further comprising extruding the at least one stiffening element and thereafter forming the two side pieces by splitting, whereby the splitting utilizes press rollers.

125. (Withdrawn) The method of claim 106, further comprising extruding the at least one stiffening element and thereafter forming the two side pieces by rolling.

126. (Withdrawn) The method of claim 106, further comprising positioning a reinforcing element between the two side pieces of the at least one stiffening element and a surface of the at least one thickened region.

127. (Withdrawn) The method of claim 106, further comprising connecting a reinforcing element to at least one of the two side pieces of the at least one stiffening element and a surface of the at least one thickened region.

128. (Withdrawn) The method of claim 106, further comprising connecting by mechanical deformation a reinforcing element to at least one of the two side pieces of the at least one stiffening element and a surface of the at least one thickened region.

129. (Withdrawn) The method of claim 128, wherein the mechanical deformation comprises rolling-in.

130. (Withdrawn) The method of claim 127, wherein the connecting comprises at least one of force-locking and form-locking connecting.

131. (Withdrawn) The method of claim 106, further comprising forming by co-extrusion the at least one stiffening element and a reinforcing element.

132. (Withdrawn) The method of claim 106, further comprising, before the joining, tensioning at least one of the at least one stiffening element and the at least one panel.

133. (Withdrawn) The method of claim 106, further comprising, during the joining, tensioning at least one of the at least one stiffening element and the at least one panel.

134. (Withdrawn) A method of producing the lightweight structural component of claim 58, the method comprising:

 milling the at least one metal panel to form the at least one thickened region; and
 joining the two side pieces to the at least one thickened region at the two separate weld joint zones.

135. (Withdrawn) A method of producing the lightweight structural component of claim 58, the method comprising:

 milling the at least one metal panel to form the at least one thickened region;
 forming as a one-piece member the at least one metal stiffening element and the two side pieces; and
 joining the two side pieces to the at least one thickened region at the two separate weld joint zones.

136. (Currently Amended) A lightweight structural component comprising:
 a metal panel comprising at least one thickened region;
 at least one stiffening element coupled to a surface of the at least one thickened region;

 the at least one stiffening element being a one-piece metal member and comprising a head portion, a bar portion and two side pieces extending from the bar portion;
 the bar portion comprising a first thickness;
 each of the two side pieces comprising a second thickness;
 the first thickness being greater than the second thickness; and
 ends and surfaces of the two side pieces being at least partially connected to the at least one thickened region by two separate weld joint zones.

137. (Original) The component of claim 136, wherein the bar portion and two side pieces of the at least one stiffening element form a generally Y-shaped cross-section.

138. (Withdrawn) The component of claim 136, wherein the bar portion and two side pieces of the at least one stiffening element form a generally T-shaped cross-section.

139. (Withdrawn) The component of claim 136, wherein the at least one stiffening element has a generally I-shaped cross-section.

140. (Previously Presented) The component of claim 136, wherein a distance between the two separate weld joint zones is greater than the first thickness.

141. (Previously Presented) The component of claim 136, wherein a distance between the two separate weld joint zones is greater than the second thickness.

142. (Previously Presented) The component of claim 136, wherein a distance between inner edges of the two separate weld joint zones is greater than the first thickness.

143. (Previously Presented) The component of claim 136, wherein a distance between inner edges of the two separate weld joint zones is greater than the second thickness.

144. (Previously Presented) The component of claim 1, wherein the two separate weld joint zones are arranged between a thickened region of the panel and the two side pieces.

145. (Previously Presented) The component of claim 144, wherein the at least one metal stiffening element comprises a one-piece metal member.

REMARKS

Summary of the Amendment

Upon entry of the instant Amendment, claims 1, 11, 58 and 136 will have been amended. Accordingly, claims 1-8, 11-66, 69-112 and 115-145 will be pending with claims 6, 18, 19, 22, 23, 28-48, 51-54, 56, 57, 64, 77-96, 98-112, 115-135, 138 and 139 being withdrawn by the Examiner on the basis of a restriction requirement.

Summary of the Official Action

In the instant Office Action, the Examiner again neglected to acknowledge Applicant's claim to foreign priority by neglecting to indicate on the form PTOL-326 that the certified copies of the priority documents have been received. The Examiner also improperly indicated that claims 6, 18, 19, 22, 23, 28-48, 51-54, 56, 57, 64, 77-96, 98-104, 138 and 139 were withdrawn from examination. Additionally, the Examiner rejected claims 1-5, 7-10, 14, 15, 20, 24-27, 49, 50, 55, 58-63, 65-69, 70-76, 97, 136, 137 and 140-143 over the art of record. Finally, the Examiner indicated that claim 11 contains allowable subject matter and would be allowed if presented in independent form and that claims 12, 13, 16, 17 and 21 are allowed. By the present remarks, Applicant submits that the rejections have been overcome, and respectfully requests reconsideration of the outstanding Office Action and allowance of the present application.

Present Amendment is proper for entry

Applicant respectfully submits that the instant amendment is proper for entry after final rejection. Applicant notes that no question of new matter is presented nor are any new issues raised in entering the instant amendment of the claims and that no new search would be required. Moreover, Applicant submits that the instant amendment places the application in condition for allowance, or at least in better form for appeal. Accordingly, Applicant requests the Examiner to enter the instant amendment, consider the merits of the same, and indicate the allowability of the present application and each of the pending claims. Applicant notes, in particular, that claims 1, 58 and 136 have been amended to recite certain features which even more clearly distinguish over the applied documents and which were previously considered by the Examiner.

Status of the Certified Priority Document

The Examiner has neglected to acknowledge Applicant's claim to foreign priority on the form PTOL-326 by neglecting to indicate whether the required certified copies of the priority documents have been received.

Applicant filed the required certified copy of the priority document on April 15, 2004 and requests that the Examiner check box 12a1 on the form PTOL-326 in the next Official Action confirming receipt of the certified copy.

Accordingly, Applicant respectfully requests that the Examiner indicate such acknowledgment on form PTOL-326 in the next office action.

Restriction Requirement

Applicant acknowledges that the Examiner has again withdrawn claims 6, 18, 19, 22, 23, 28-48, 51-54, 56, 57, 64, 77-96, 98-104, 138 and 139 as not reading on the invention of Group I. Applicant notes, however, that the Examiner is not correct that claims 105-112 and 115-135 are not pending, and assumes that the Examiner intended to withdraw this claims as well.

Applicant again notes, in particular, that the restriction requirement dated February 12, 2006 did not set forth any species election requirement and the Examiner cannot properly withdraw any claims based thereon. The restriction requirement dated February 12, 2006 merely set forth a restriction requirement between Group I directed to claims 1-104 and 136-143, and Group II directed to claims 105-135.

Accordingly, the basis of election of species was entirely improper and should be withdrawn. Furthermore, Applicant submits that each of the new claims clearly reads on the elected invention of Group I.

Traversal of Rejections Under 35 U.S.C. § 103(a)

Over Mueller with Palm, Bauer and Schmidt

Applicant respectfully traverses the rejection of claims 1-5, 7, 8, 14, 15, 20, 24-27, 49, 50, 55, 58, 62, 63, 65, 66, 69, 97, 136, 137 and 140-145 under 35 U.S.C. § 103(a) as unpatentable over US Patent No. 6,173,925 to MUELLER et al. in view of US Patent No. 6,543,721 to PALM, US Patent No. 5,501,414 to BAUER, and US Patent No. 6,595,467 to

SCHMIDT.

The Examiner acknowledges that MUELLER lacks, among other things, the recited thickened region, using metal as the material for the panel and the stiffening element, and the recited two separate weld joints. However, the Examiner asserts that PALM and BAUER teaches to make the panel and stiffening element of metal and to use a weld joint and that SCHMIDT teaches the recited thickened region. The Examiner then concludes that it would have been obvious to one of ordinary skill in the art to combine the teachings of these documents. Applicant respectfully traverses this rejection.

Notwithstanding the Office Action assertions as to what these documents disclose or suggest, Applicant submits that no proper combination of these documents discloses or suggests: inter alia, a lightweight structural component comprising at least one *metal panel*, at least one *metal stiffening element*, the at least one metal stiffening element comprising two side pieces, and each **end surface** of the two side pieces being at least partially connected to the at least one metal panel in a material-locking manner, wherein *the two side pieces are connected to the at least one metal panel at two separate weld joint zones*, as recited in amended independent claim 1; inter alia, a lightweight structural component comprising at least one *metal panel* comprising at least one thickened region, at least one *metal stiffening element welded to the at least one panel*, the at least one metal stiffening element comprising a bar portion and two side pieces, and each **end surface** of the two side pieces being at least partially connected in a material-locking manner to the at least one thickened region *by two separate weld joint zones*, whereby the at least one metal

stiffening element is oriented in at least one of a lengthwise and a crosswise direction, as recited in amended independent claim 58; and inter alia, a lightweight structural component comprising a *metal panel* comprising at least one thickened region, at least one stiffening element coupled to a surface of the at least one thickened region, the at least one stiffening element being a *one-piece metal member* and comprising a head portion, a bar portion and two side pieces extending from the bar portion, the bar portion comprising a first thickness, each of the two side pieces comprising a second thickness, the first thickness being greater than the second thickness, and **end surfaces of the two side pieces being at least partially connected to the at least one thickened region by two separate weld joint zones** as recited in amended independent claim 136.

Applicant acknowledges that MUELLER teaches a stiffening element 20 having two side pieces which are fixed to a panel 30. However, MUELLER specifically discloses an adhesive attachment of side surfaces of the side pieces 27 and 27' to the skin 30 (see Fig. 1 and col. 3, lines 64-66). The end surfaces of side pieces 27 and 27' are, however, disclosed as being connected to the panel 30. Furthermore, MUELLER specifically states that the member 24 is fiber composite member (see col. 4, lines 14-15). The invention, in contrast, recites that the panel is at least one *metal panel* and that the stiffening element is at least one *metal stiffening element*. These features are simply not disclosed or suggested by MUELLER.

PALM does not cure the above-noted deficiencies of MUELLER. While it is apparent that PALM discloses a stiffening element 2 that is welded to a fuselage panel 1,

the stiffening element 2 in PALM does not utilize two side pieces which are connected to the panel 1, and instead utilizes one area (defined by width "a") which is connected to the panel 1 by a weld joint. As such, PALM uses a single weld joint zone and not *two separate weld joint zones*.

BAUER does not cure the above-noted deficiencies of MUELLER and PALM. While it is apparent that BAUER discloses connecting stiffening elements 26 that is connected to a panel 24, the stiffening elements 26 BAUER do not utilize two side pieces which are connected to the panel 24, and instead utilizes a single bent area which is connected to the panel 24 by rivets (see col. 5, lines 11-15). As such, BAUER uses a single weld riveted zone and not *two separate weld joint zones*.

SCHMIDT does not cure the above-noted deficiencies of MUELLER, PALM and BAUER. While it is apparent that SCHMIDT discloses a stiffening element 2 that is welded to a fuselage panel 1, the stiffening element 2 in SCHMIDT also does not utilize two side pieces which are connected to the panel 1, and instead utilizes one main web, e.g., 3A, which is connected to the panel 1 by a weld joint, e.g., 4A. As such, SCHMIDT uses a single weld joint zone and not *two separate weld joint zones*.

Thus, Applicant submits that the above-noted documents fail to disclose or suggest the features recited in at least independent claims 1, 58 and 136. Because no proper combination of the above-noted documents discloses or suggests at least the above-noted features of the instant invention, Applicant submits that no proper combination of MUELLER, PALM, BAUER and SCHMIDT can render unpatentable the combination of

features recited in at least independent claims 1, 58 and 136.

Furthermore, Applicant submits that there is no motivation or rationale disclosed or suggested in the art to modify any of the applied documents in the manner asserted by the Examiner. Nor does the Examiner's opinion provide a proper basis for these features or for the motivation to modify these documents, in the manner suggested by the Examiner. Therefore, Applicant submits that the invention as recited in at least independent claims 1, 58 and 136 is not rendered obvious by any reasonable inspection of this disclosure.

Applicant directs the Examiner's attention to the guidelines identified in M.P.E.P section 2141 which state that "[i]n determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

As this section clearly indicates, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

Moreover, it has been legally established that "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior

art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) Although a prior art device 'may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.' 916 F.2d at 682, 16 USPQ2d at 1432.). See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references)."

Additionally, it has been held that a statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levingood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

Furthermore, Applicant submits that dependent claims 2-5, 7, 8, 14, 15, 20, 24-27, 49, 50, 55, 58, 62, 63, 65, 66, 69, 97, 137 and 140-145 are allowable at least for the reason that these claims depend from an allowable base claim and because these claims recite additional features that further define the present invention. In particular, Applicant submits that no proper combination of MUELLER, PALM, BAUER and SCHMIDT discloses or suggests; that the component is utilized in an aircraft and the at least one stiffening element is oriented at least one of a lengthwise and a crosswise direction relative to the at

least one panel as recited in claim 2; that the at least one panel comprises a skin sheet as recited in claim 3; that the at least one panel comprises a thickened region in an area of the two separate weld joint zones as recited in claim 4; that the at least one stiffening element comprises a stringer which is oriented in a lengthwise manner as recited in claim 5; that the two separate weld joint zones comprise laser beam weld zones as recited in claim 7; that the two separate weld joint zones comprise friction stir weld zones as recited in claim 8; that the two side pieces are bent or oriented away from each other by a total angle α , whereby inner surfaces of the two side pieces and a surface of the at least one panel form a generally isosceles triangle as recited in claim 14; that the angle α lies in a range of between approximately 7° and approximately 50° as recited in claim 15; that the two side pieces are integrally formed with the at least one stiffening element, whereby the at least one stiffening element and the two side pieces comprise a one-piece member as recited in claim 20; that the at least one stiffening element comprises an edge area which is oriented in a generally parallel manner relative to the at least one panel as recited in claim 24; that the at least one panel comprises a panel reinforcing base portion which comprises a first base portion and a second base portion separated from the first base portion, wherein lateral outer surfaces of the first and second base portions rest against or adjacent to inner surfaces of the two side pieces as recited in claim 25; that an area of the at least one panel comprising the two weld joint zones comprises a surface formed by metal cutting as recited in claim 26; that an area of the at least one panel comprising the two weld joint zones comprises a surface formed by metal removal as recited in claim 27;

that the at least one panel comprises a panel stiffening base made of material that is deformed during a rolling-in of a stress relief element into the at least one panel as recited in claim 49; that the at least one panel comprises a panel stiffening base made of material that is deformed during a rolling of the at least one panel as recited in claim 50; that the at least one stiffening element comprises a head portion that is coupled to a bar portion as recited in claim 55; that the component is arranged on an aircraft as recited in claim 62; that the at least one stiffening element comprises a stringer oriented in a lengthwise direction as recited in claim 63; that the two separate weld joint zones comprise laser beam weld zones as recited in claim 65; that the two separate weld joint zones comprise friction stir weld zones as recited in claim 66; that the two weld joint zones comprise panel surfaces and surfaces of the two side pieces, and wherein each of the panel and two side piece surfaces comprises a machined surface as recited in claim 69; that the at least one panel comprises a sheet skin for one of an aircraft, a boat and a ship as recited in claim 97; that the bar portion and two side pieces of the at least one stiffening element form a generally Y-shaped cross-section as recited in claim 137; that a distance between the two separate weld joint zones is greater than the first thickness as recited in claim 140; that a distance between the two separate weld joint zones is greater than the second thickness as recited in claim 141; that a distance between inner edges of the two separate weld joint zones is greater than the first thickness as recited in claim 142; that a distance between inner edges of the two separate weld joint zones is greater than the second thickness as recited in claim 143; that the two separate weld joint zones are arranged between a

thickened region of the panel and the two side pieces as recited in claim 144; and that the at least one metal stiffening element comprises a one-piece metal member as recited in claim 145.

Accordingly, Applicant requests that the Examiner reconsider and withdraw the above-noted rejection under 35 U.S.C. § 103(a) and indicate that these claims are allowable over the applied art of record.

Over Mueller and Schmidt with Lackman

Applicant respectfully traverses the rejection of claims 59-61 and 70-76 under 35 U.S.C. § 103(a) as unpatentable over MUELLER in view of SCHMIDT and further in view of US Patent No. 4,256,790 to LACKMAN et al.

The Examiner acknowledges that MUELLER and SCHMIDT lack, among other things, the recited reinforcing element. However, the Examiner asserts that this feature is taught by LACKMAN and that it would have been obvious to one of ordinary skill in the art to combine the teachings of these documents. Applicant respectfully traverses this rejection.

Notwithstanding the Office Action assertions as to what these documents disclose or suggest, Applicant submits that no proper combination of these documents discloses or suggests: inter alia, a lightweight structural component comprising at least one *metal panel* comprising at least one thickened region, at least one *metal stiffening element welded to the at least one metal panel*, the at least one metal stiffening element comprising a bar

portion and two side pieces, and each of the two side pieces being at least partially connected in a material-locking manner to the at least one thickened region *by two separate weld joint zones*, whereby the at least one metal stiffening element is oriented in at least one of a lengthwise and a crosswise direction, as recited in amended independent claim 58.

As explained above, MUELLER specifically discloses an adhesive attachment of the side surfaces of the side pieces 27 and 27' to the skin 30 (see Fig. 1 and col. 3, lines 64-66). Furthermore, MUELLER specifically states that the member 24 is fiber composite member (see col. 4, lines 14-15). The invention, in contrast, recites that the panel is at least one *metal panel* and that the stiffening element is at least one *metal stiffening element*. These features are simply not disclosed or suggested by MUELLER. Additionally, the invention provides that *the end surfaces of the two side pieces are connected to the at least one metal panel at two separate weld joint zones*. As MUELLER discloses an adhesive connection between side surfaces of the side pieces 27 and 27' and the rib 30, MUELLER cannot be said to disclose the recited weld joints between these members.

SCHMIDT does not cure the above-noted deficiencies of MUELLER. As noted above, while it is apparent that SCHMIDT discloses a stiffening element 2 that is welded to a fuselage panel 1, the stiffening element 2 in SCHMIDT does not utilize two side pieces which are connected to the panel 1, and instead utilizes one main web, e.g., 3A, which is

connected to the panel 1 by a weld joint, e.g., 4A. As such, SCHMIDT uses a single weld joint zone and not *two separate weld joint zones*.

LACKMAN does not cure the above-noted deficiencies of any proper combination of MUELLER and SCHMIDT. While it is apparent that LACKMAN discloses a stiffening element 22/23 that is connected to a panel 20 by bonding, and that utilizes a filler 30, the stiffening element 22/23 and panel 30 in LACKMAN are composite material structures and not metal members. Furthermore, the side surfaces (not the end surfaces) of the two side pieces of the stiffening element 22/23 are connected to the panel 20 by bonding, and are not connected to the panel 20 by *two separate weld joint zones*.

Thus, Applicant submits that the above-noted documents fail to disclose or suggest the features recited in at least independent claim 58. Because no proper combination of the above-noted documents discloses or suggests at least the above-noted features of the instant invention, Applicant submits that no proper combination of MUELLER, SCHMIDT and LACKMAN can render unpatentable the combination of features recited in at least independent claim 58.

Furthermore, Applicant submits that there is no motivation or rationale disclosed or suggested in the art to modify any of the applied documents in the manner asserted by the Examiner. Nor does the Examiner's opinion provide a proper basis for these features or for the motivation to modify these documents, in the manner suggested by the Examiner. Therefore, Applicant submits that the invention as recited in at least independent claim 58 is not rendered obvious by any reasonable inspection of this disclosure.

Furthermore, Applicant submits that dependent claims 59-61 and 70-76 are allowable at least for the reason that these claims depend from an allowable base claim and because these claims recite additional features that further define the present invention. In particular, Applicant submits that no proper combination of MUELLER, SCHMIDT and LACKMAN discloses or suggests; that the component further comprises a reinforcing element located in a cavity formed by the two side pieces and a surface of the at least one thickened region as recited in claim 59; that the at least one thickened region comprises a panel stiffening base and wherein the reinforcing element comprises a high-strength material having a modulus of elasticity that is generally greater than a modulus of elasticity of a material of at least one of the at least one panel and the at least one stiffening element as recited in claim 60; that the reinforcing element is connected to at least one of the two side pieces and to the at least one panel stiffening base in one of a force-locking manner and a form-locking manner as recited in claim 61; that the component further comprises a reinforcing element having surfaces which are both force-locked and form-locked to at least one of inner surfaces of the two side pieces and a surface of the thickened region as recited in claim 70; that the surfaces comprise at least one of a rough profile and surface profiling as recited in claim 71; that the component further comprises a reinforcing element which comprises surfaces which are fixed to at least one of inner surfaces of the two side pieces and a surface of the thickened region as recited in claim 72; that the component further comprises a cavity formed by the two side pieces and the at least one thickened region and a reinforcing element arranged within the cavity as recited

in claim 73; that a cross-sectional shape of the cavity generally corresponds to a cross-sectional shape of the reinforcing element as recited in claim 74; that the cavity comprises a cross-sectional shape having a form of a generally equal isosceles triangle with a rounded-off apex as recited in claim 75; and that the reinforcing element comprises a cross-sectional shape having a form of a generally equal isosceles triangle with a rounded-off apex as recited in claim 76.

Accordingly, Applicant requests that the Examiner reconsider and withdraw the above-noted rejection under 35 U.S.C. § 103(a) and indicate that these claims are allowable over the applied art of record.

Allowable Subject matter

Applicant appreciates the Examiner's indicating that claim 11 contains allowable subject matter and that claims 12, 13, 16, 17 and 21 are allowed. Accordingly, as claim 11 has been presented in independent form, Applicant submits that claim 11 should also be indicated as being allowed. Additionally, Applicant submits that all pending claims should be indicated as being allowed.

Request for Rejoinder of Non-Elected Claims

Applicant submits that rejoinder of withdrawn claims 6, 18, 19, 22, 23, 28-48, 51-54, 56, 57, 64, 77-96, 98-112, 115-135, 138 and 139 is now proper. These claims should be rejoined because these claims depend from claims 1, 58 and 136 which are believed to be

allowable. Applicant refers the Examiner to MPEP 821.04 which indicates that withdrawn claims which depend from or otherwise include all the limitations of the allowable claims will be rejoined if presented prior to allowance and issuance of a final rejection. Accordingly, Applicant requests that the Examiner rejoin all the withdrawn claims directed to the non-elected invention and consider the merits of the same.

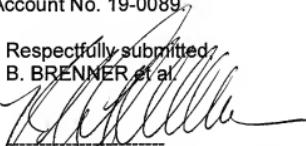
CONCLUSION

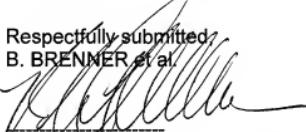
In view of the foregoing, it is submitted that none of the references of record, either taken alone or in any proper combination thereof, anticipate or render obvious the Applicant's invention, as recited in each of the pending claims. The applied references of record have been discussed and distinguished, while significant claimed features of the present invention have been pointed out.

Accordingly, reconsideration of the outstanding Office Action and allowance of the present application and all the claims therein are respectfully requested and now believed to be appropriate.

Authorization is hereby given to refund excess payments and charge any additional fee necessary to have this paper entered to Deposit Account No. 19-0089.

Respectfully submitted,
B. BRENNER et al.


Neil F. Greenblum
Reg. No. 28,394


Robert W. Mueller
Reg. No. 35,043

May 1, 2007
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
703-716-1191